

# "Vulcan": a collaborative high-resolution process-based U.S. fossil fuel CO<sub>2</sub> inventory project

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# Vulcan Project

## Context:

Quantification of NA carbon budget requires improved, dynamic, process-based estimates of fossil/industrial CO<sub>2</sub> emissions

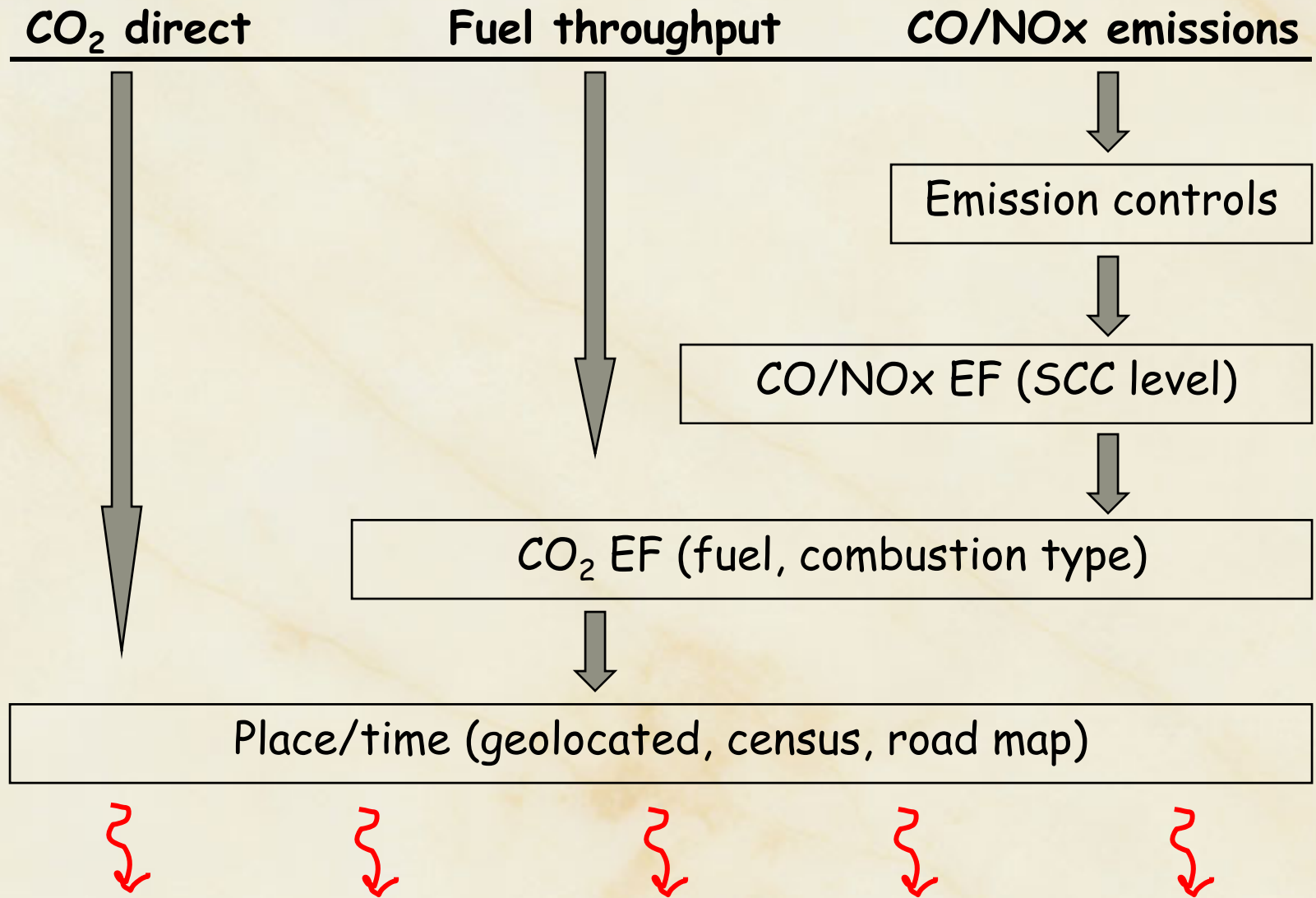
## Goal:

Generate high-resolution (10s km/hourly), process-based fossil/industrial CO<sub>2</sub> emissions for North America

## Solution:

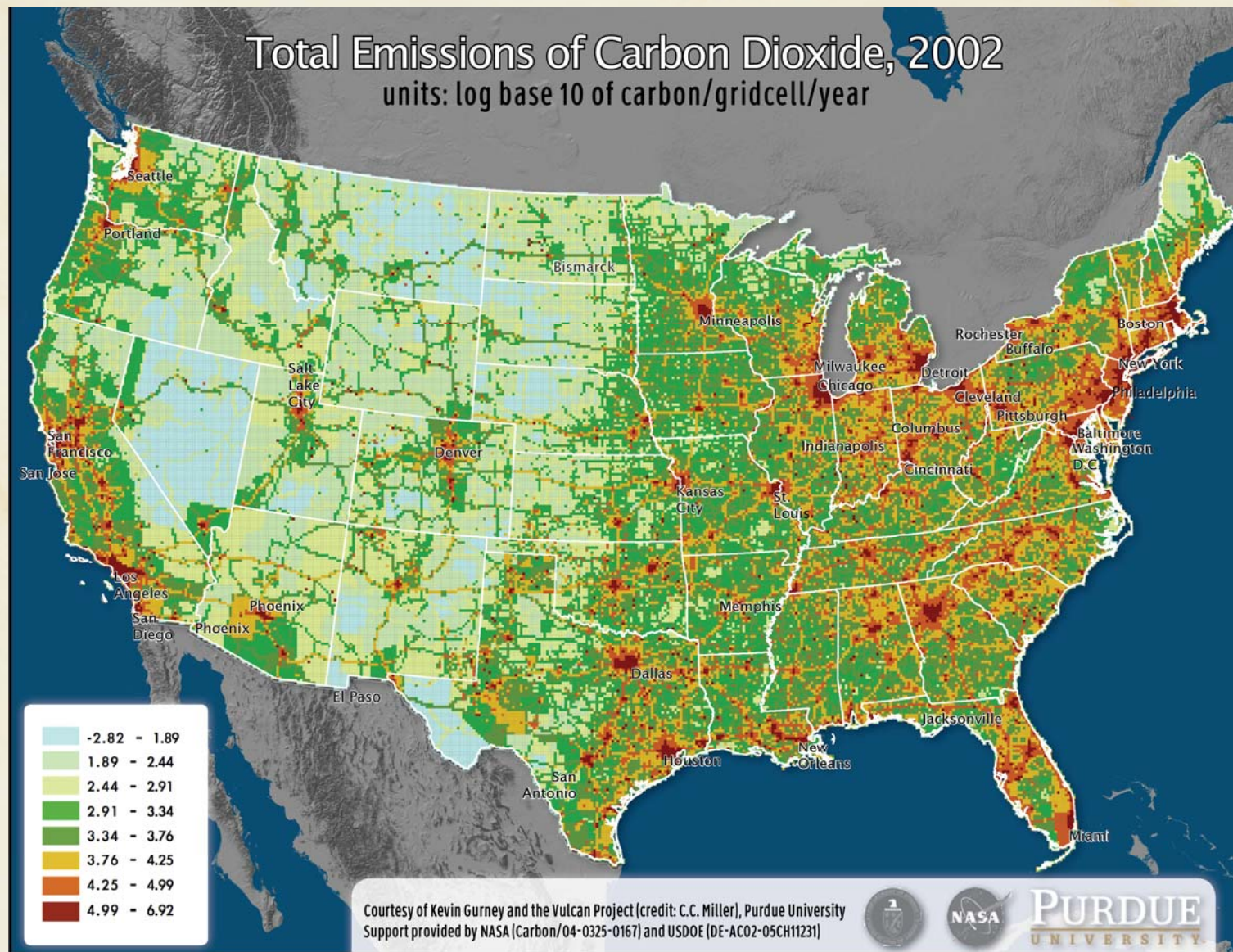
Leverage off the long-history of Air Quality monitoring in North America

# Manipulate existing AQ to generate $CO_2$



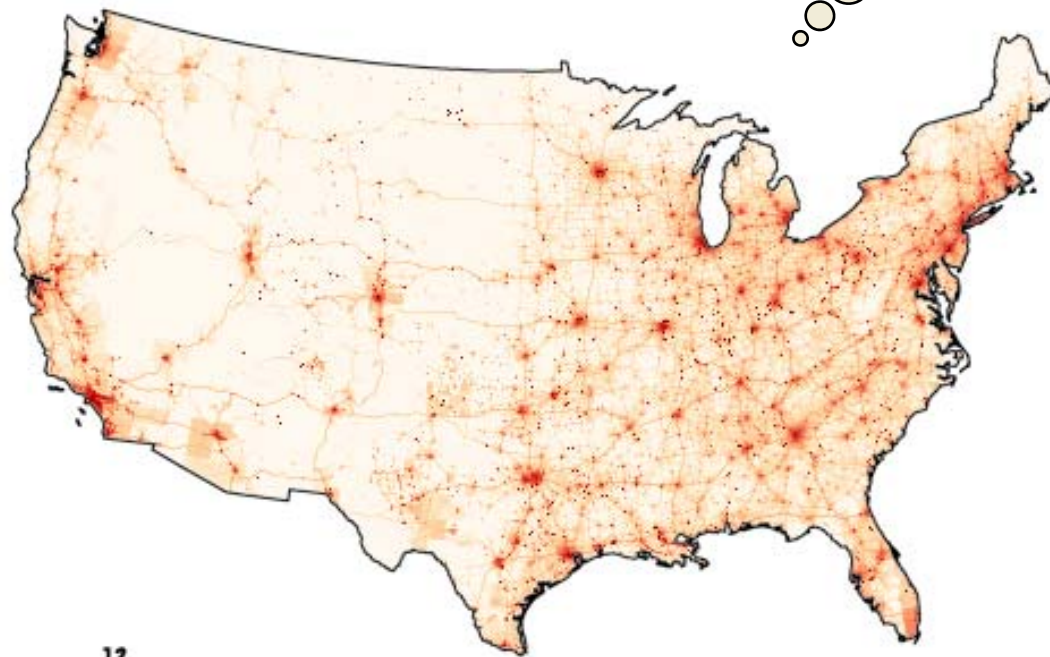


# Results



# Dynamic Emissions

Power production and  
transport are only time  
dependent sources



January 2002

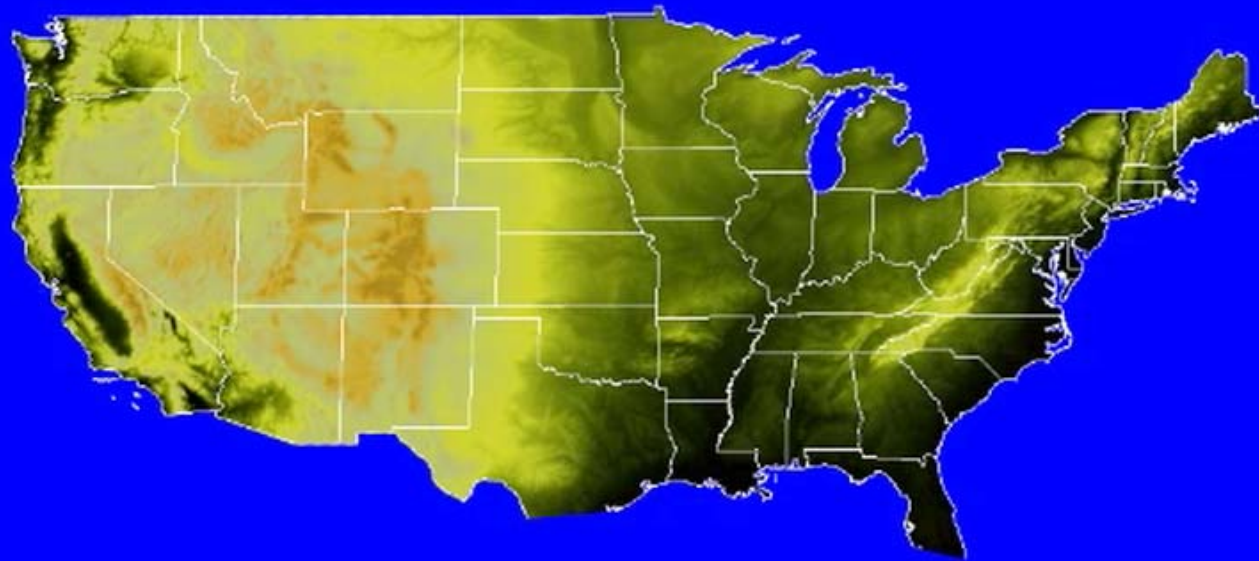


Hourly Carbon Emissions (metric tons)





# Transport



2002 May 1 0:00:00

# Aggregate Evaluation

**Table:** 2002 fossil CO<sub>2</sub> (GtC/year)

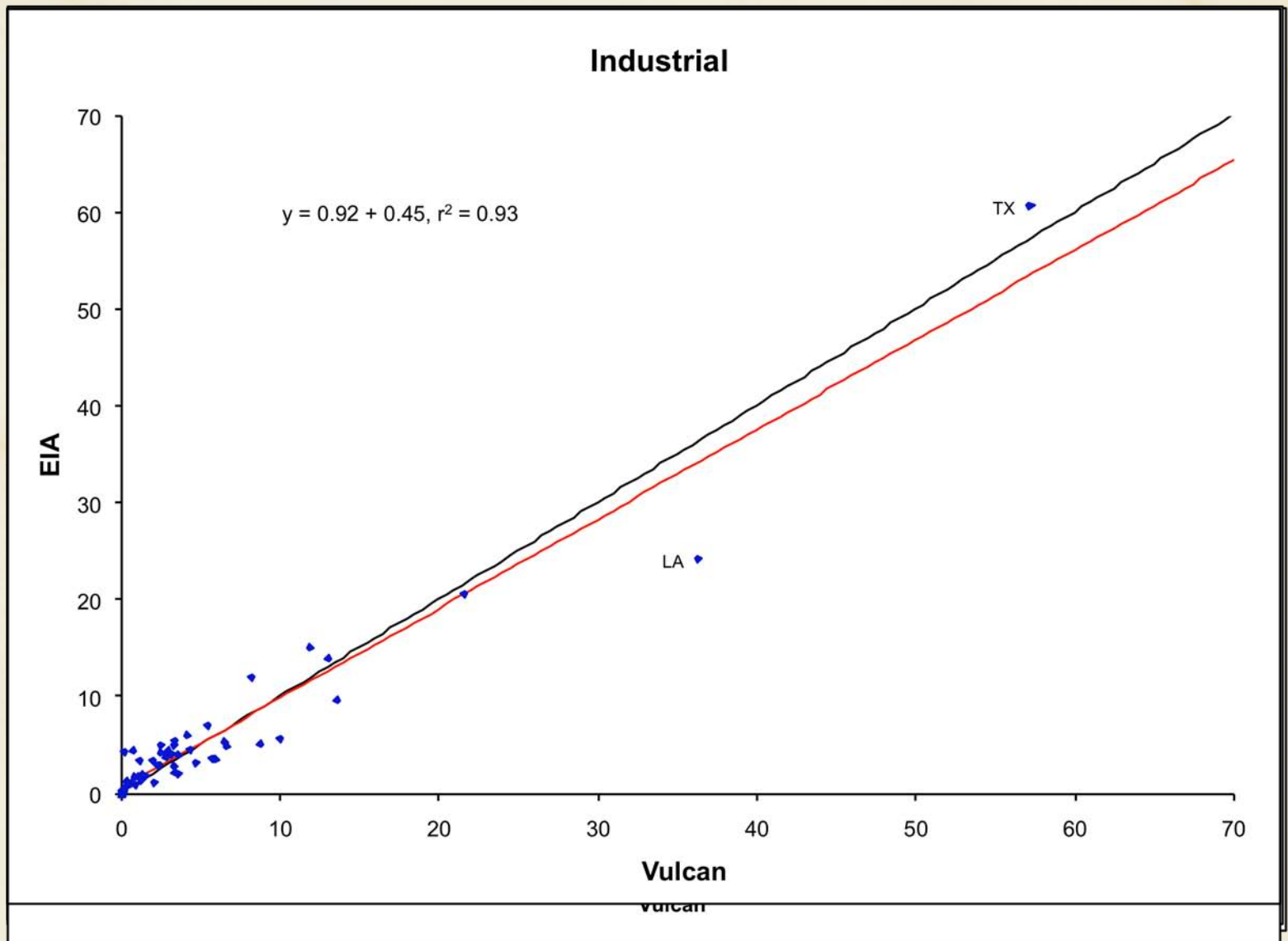
category	This study	EIA
transport <sup>1</sup>	0.45	0.51
industrial	0.31	0.28
electricity	0.61	0.61
residential	0.10	0.10
commercial	0.057	0.062
cement	0.014	0.012
Total	<b>1.54</b>	<b>1.58</b>

<sup>1</sup> Vulcan missing nonroad and aircraft (~10%)

Semi-formal uncertainty analysis underway!

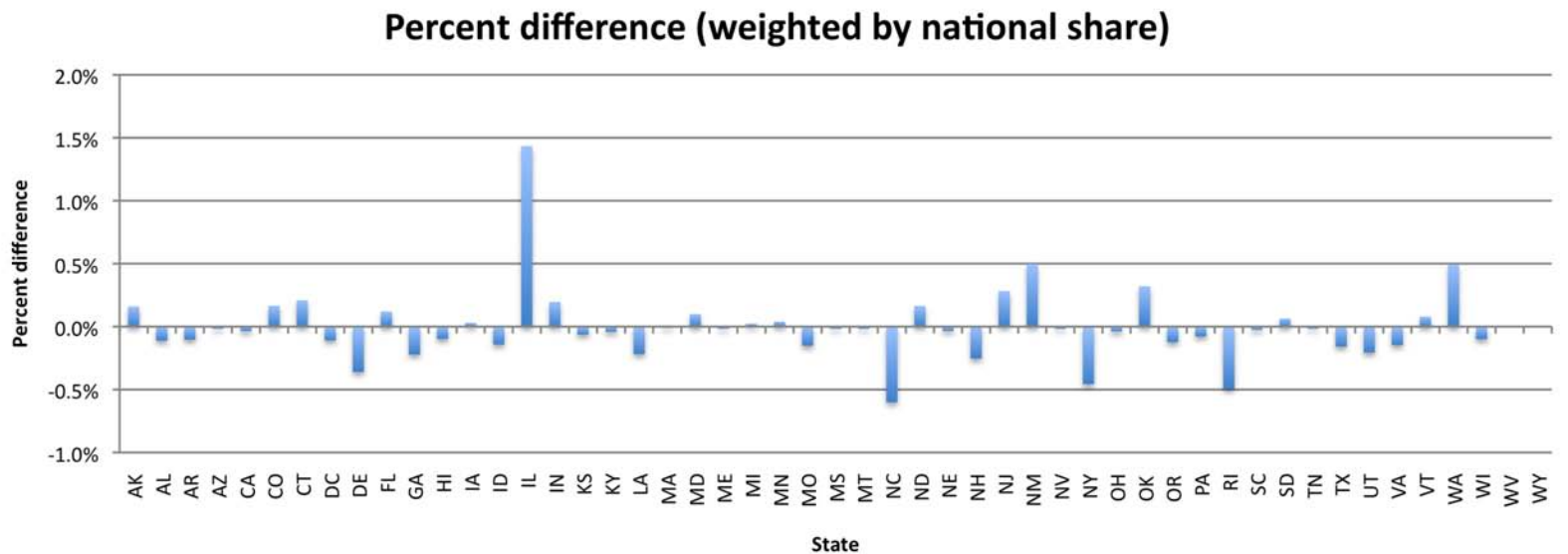
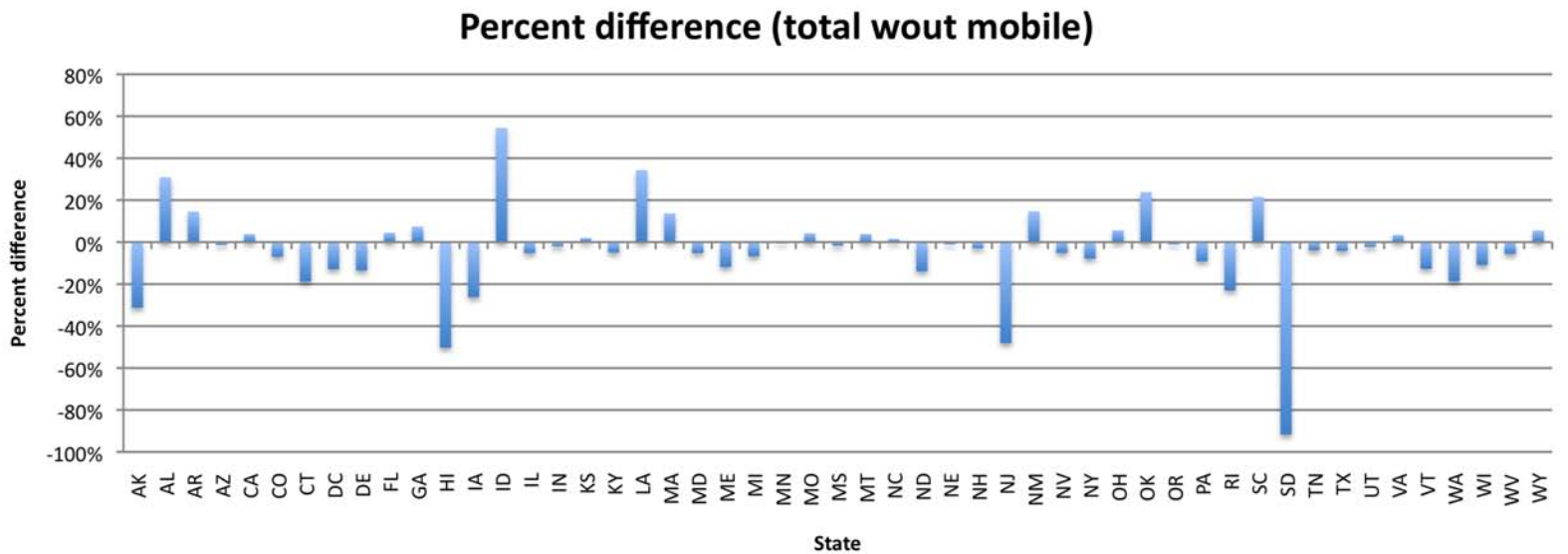
Canada & Mexico underway

# Evaluation: EIA SEDS

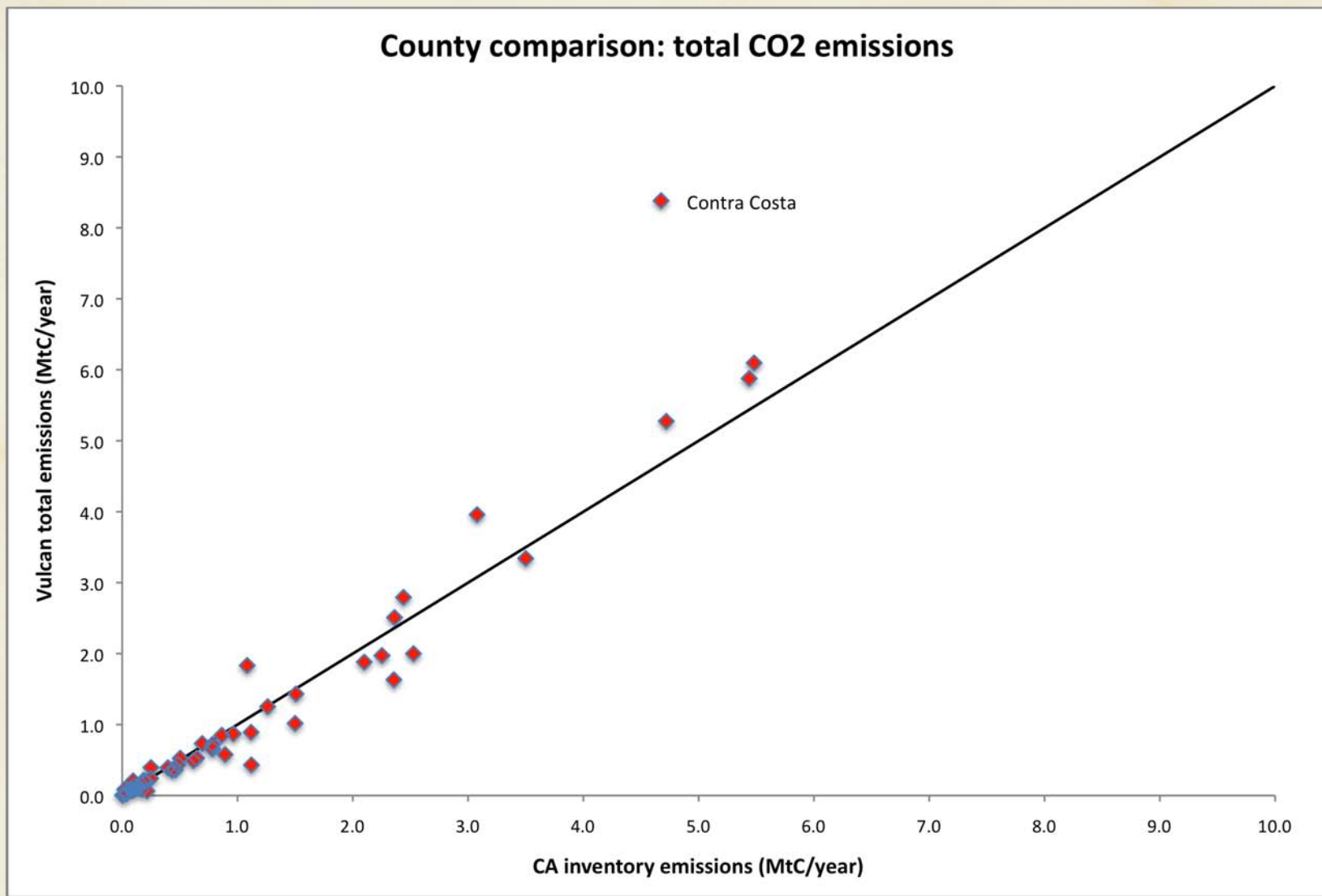




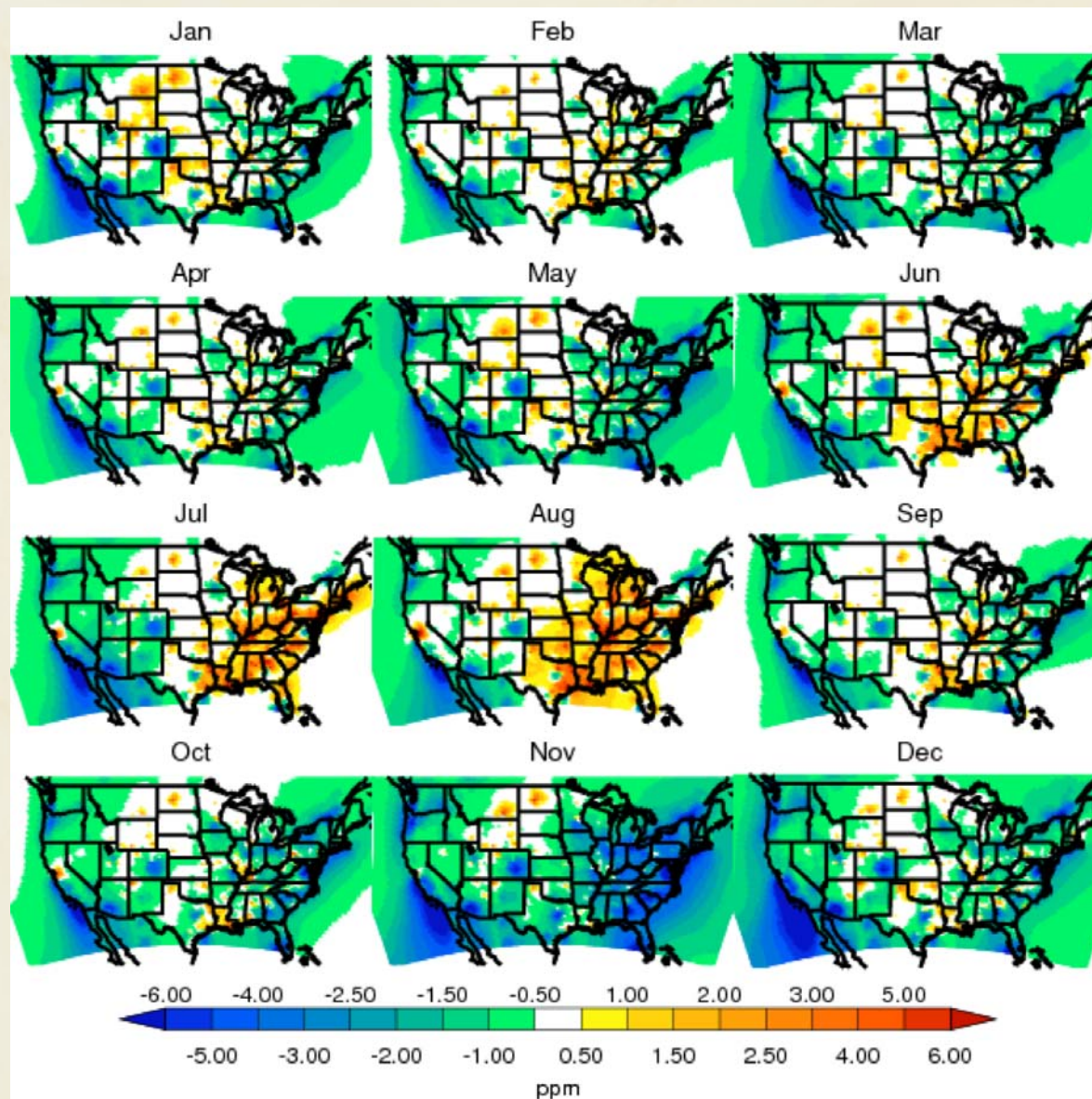
# Evaluation: EIA SEDS



# Evaluation: CA data



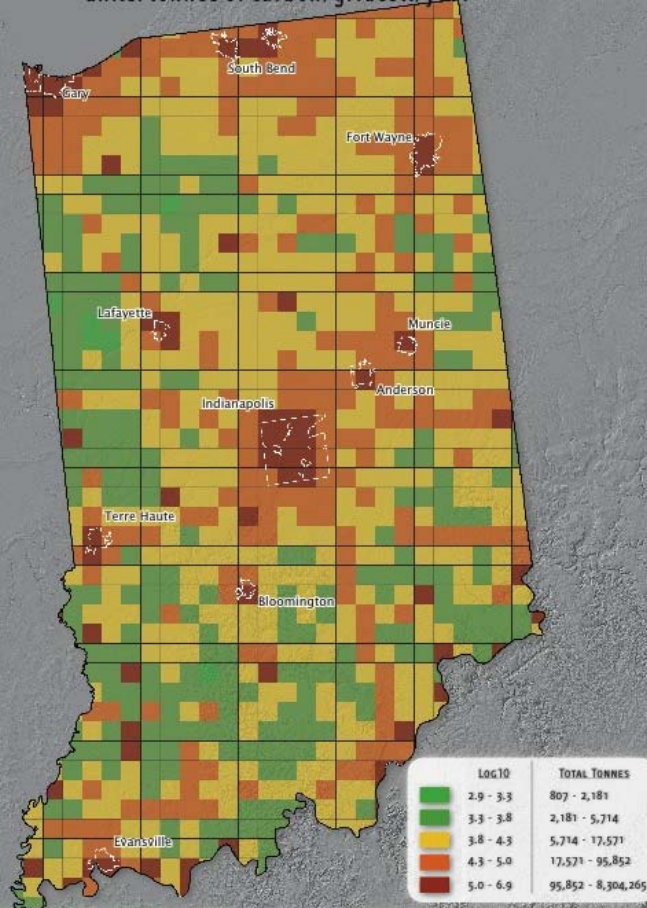
# Concentration Comparison





# Extension/Application

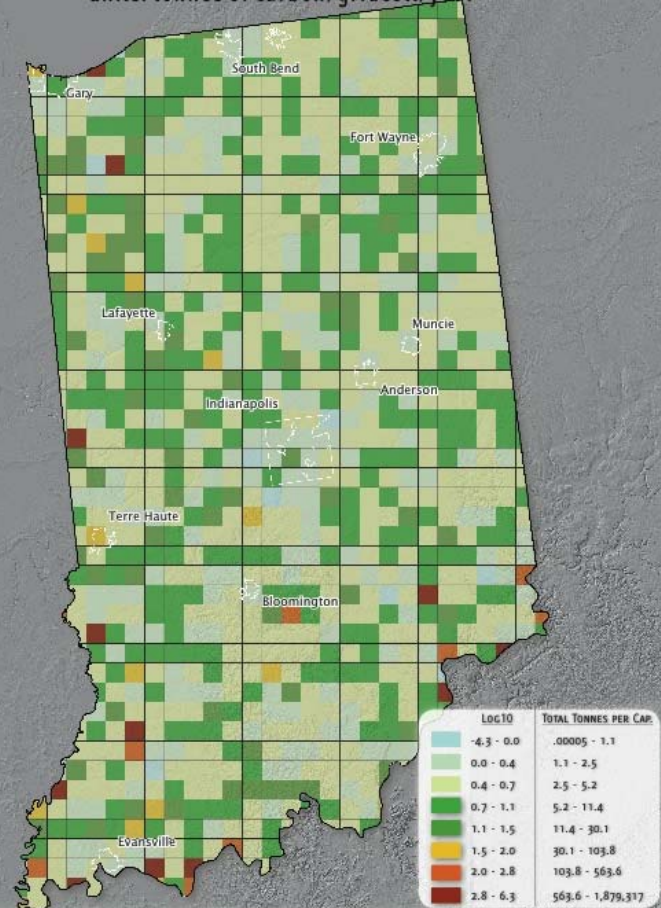
Total Emissions of Carbon Dioxide, 2002  
units: tonnes of carbon/gridcell/year



Courtesy of Kevin Gurney and the Vulcan Project (credit: C.C. Miller), Purdue University  
Support provided by NASA (Carbon/04-0325-0167) and USDOE (DE-AC02-05CH1231)



Total Per Capita Emissions of Carbon Dioxide, 2002  
units: tonnes of carbon/gridcell/year

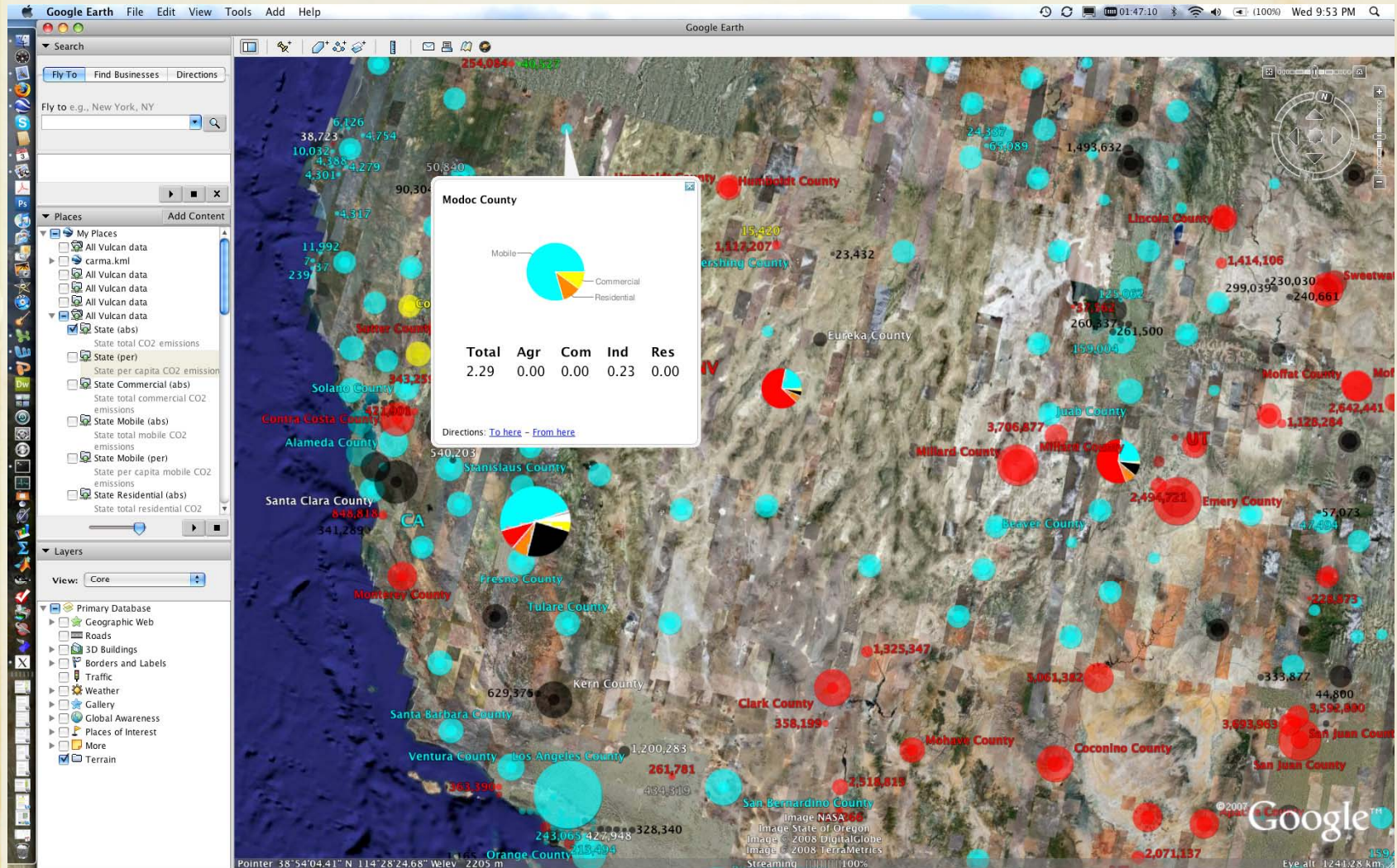


Courtesy of Kevin Gurney and the Vulcan Project (credit: C.C. Miller), Purdue University  
Support provided by NASA (Carbon/04-0325-0167) and USDOE (DE-AC02-05CH1231)





# Google Earth





# Hestia

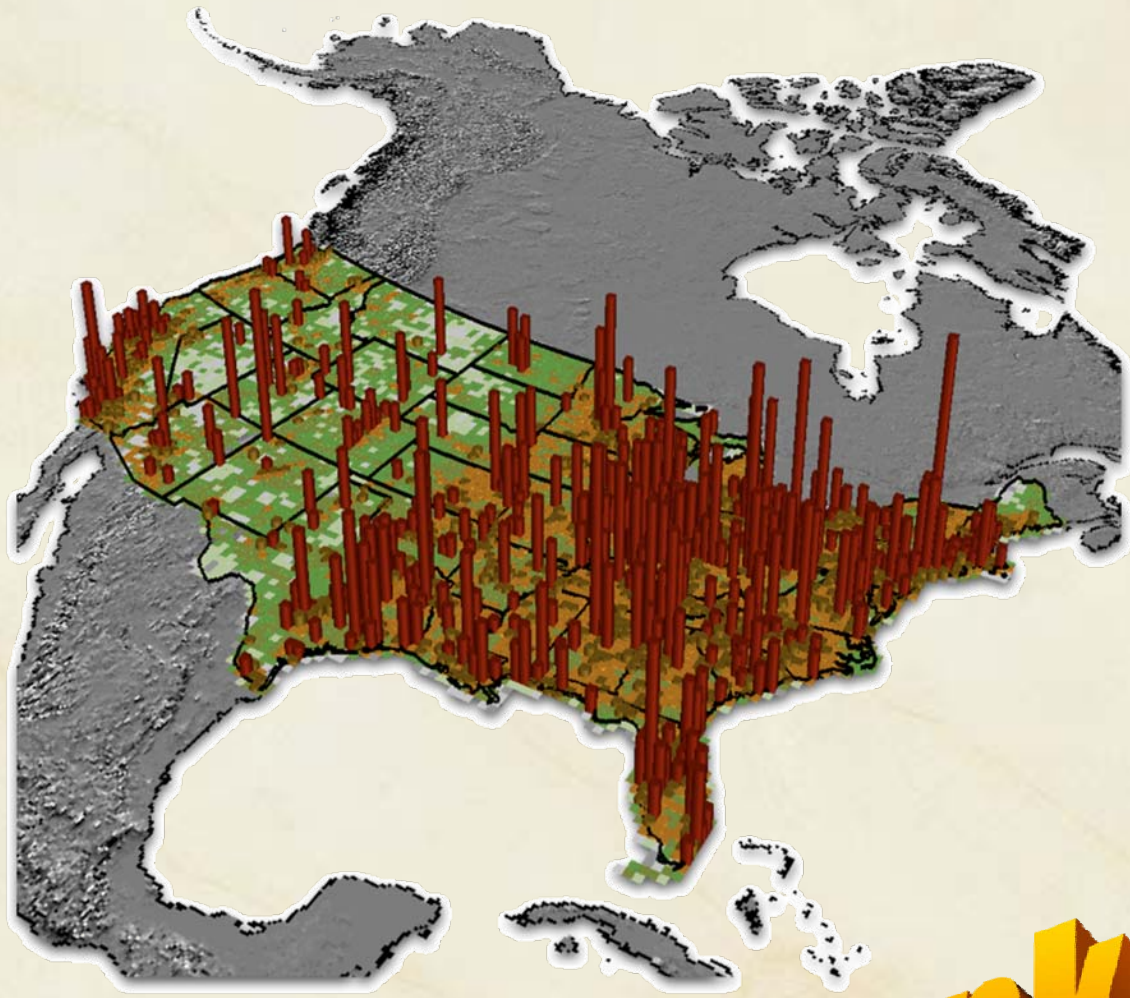






# Collaborative Potential

- Local knowledge complementing national infrastructure
- Mutual benefit
- Value added analysis
- Great evaluation potential



**Thank You!**

# Public empowerment

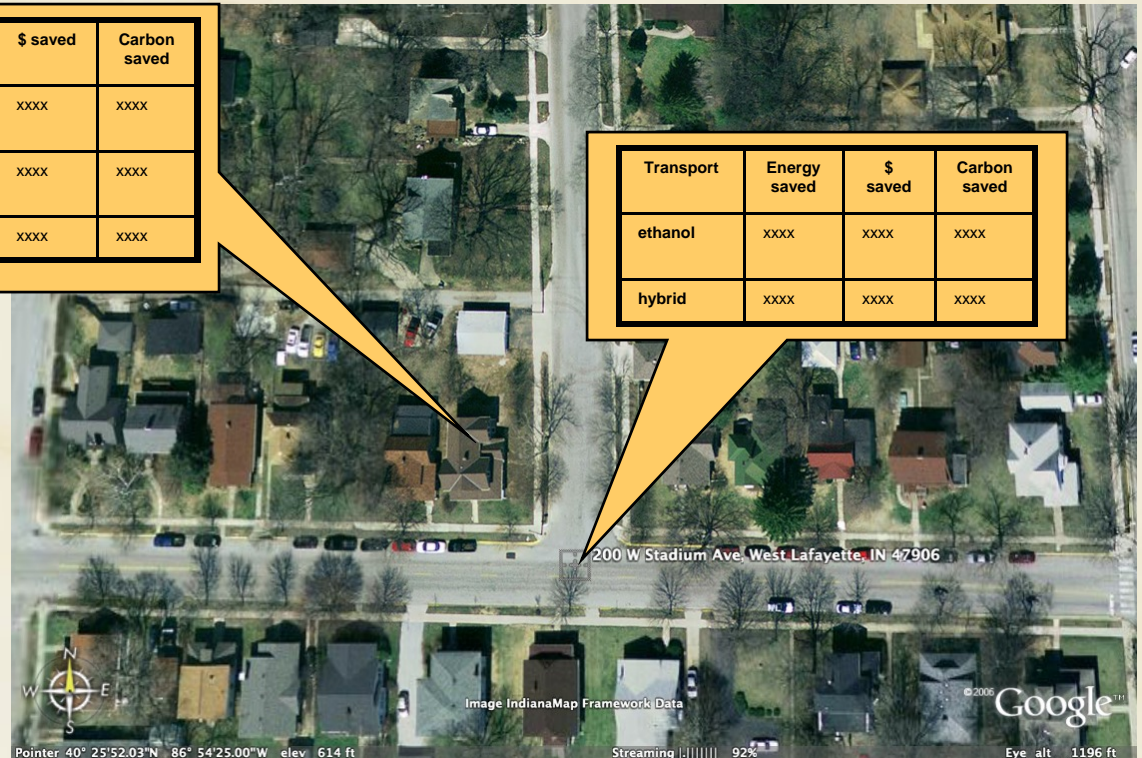
Offers an *unprecedented, visceral* connection to "solution technology"

Links consumers and producers within a digital world where a consumer has control over options

Insulation	Energy saved	\$ saved	Carbon saved
R13 to R15	XXXX	XXXX	XXXX
R15 to R18	XXXX	XXXX	XXXX
windows	XXXX	XXXX	XXXX

Transport	Energy saved	\$ saved	Carbon saved
ethanol	XXXX	XXXX	XXXX
hybrid	XXXX	XXXX	XXXX

Climate change in  
The living room  
Leveraged off of  
now-familiar platform





# Some attributes

- Methodological consistency
  - 2-way data structure
  - Grassroots == world
  - National goals to local action
  - Efficiency
  - Urban comparison
  - Everybody trades
  - Assessment, verification
  - Visualize solutions/connections
- Scientific credibility, ensure value



Downscale?.....**TRANSCEND SCALE**